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Testimony before the U.S. House of Representatives' Energy Subcommittee
of the Science Committee
Hearing on Nuclear R&D and the Idaho National Laboratory
June 24, 2004

My name is Robert L. Long. I am a Ph.D. Nuclear Engineer with over 45 years experience as a researcher, academic and nuclear utility company executive. I am a charter member of the U.S. DOE Nuclear Energy Research Advisory Committee (NERAC). In 2002-2003 I served as Chair of the Infrastructure Task Force (ITF) that was asked to advise the Department of Energy concerning the maintenance, upgrade and new construction needs of the Idaho National Energy and Environmental Laboratory (INEEL), including Argonne National Laboratory-West (ANL-W), as DOE's lead nuclear energy laboratory. The Infrastructure Task Force (ITF) was made up of the following members:

Robert L. Long, ITF Chair, Owner, Nuclear Stewardship, LLC
Michael L. Corradini, Chair, Nuclear Engineering, University of Wisconsin-Madison
Jose L. M. Cortez, Chair, Physics and Geology, University of Texas Pan American
Warren F. Miller, Jr., Deputy Director (retired), Los Alamos National Laboratory
Allen L. Sessoms, President, University of Delaware

After receiving extensive written materials from DOE, the INEEL and ANL-W, on November 6-8, 2002 the ITF visited the Idaho site and received briefings and tours of the facilities. After ITF review, INEEL and ANL-W provided updated facility descriptions that were used in the preparation of the ITF Report. On January 7-8, 2003 the ITF met in Albuquerque, NM to complete their Report which was then submitted to the DOE on January 16, 2003. The Report was accepted by NERAC at their meeting in November 2003 and formally transmitted to the Secretary of Energy in May 2004.

The Task Force Report includes an overview of the Idaho site and facilities, including more detailed comments on a few key facilities. Another section discusses a number of human resource and staff issues. At the time of the Task Force effort it was not known that INEEL and ANL-W were to be combined into a new entity to be designated as Idaho Nuclear Laboratory. So, the Report includes a discussion of the relationships and memoranda of understanding and agreement between the two laboratories. Members of the Task Force fully endorse the decision to combine the laboratories under a single management structure. While there was not time to examine the roles of universities and other DOE laboratories in the nuclear energy R&D missions of DOE, the Task force devoted a section of the Report to this important topic.

The primary conclusions reached by the ITF are:

- It is significant and important for DOE to have designated a lead laboratory for nuclear energy research and development.
- The funding at the Idaho site, given the lead-lab status is clearly insufficient.

- If Idaho site facilities are to be used for the proposed missions (e.g. Advanced Fuel Cycle Initiative, Generation IV Reactor R&D and other nuclear energy work beyond 2010) resources must be provided at appropriate levels.
- Where appropriate resources have been made available, world-class facilities (e.g. Advanced Test Reactor, Fuel Cycle Facility) exist and are supported by top-notch staff and innovative programs.
- Conversely there are certain facilities (e.g., Fuel Processing Facility) that have lost their missions and for which significant maintenance challenges exist. These facilities should be abandoned.
- INEEL is urged to develop a facilities consolidation plan, once the NE technical mission is better defined. Note: INEEL has issued a Ten-Year Site Plan that is now available.

The most important recommendations of the ITF are:

- Given events since the *National Energy Strategy* was issued, the federal commitment to nuclear energy needs to be restated and reinforced by the White House and other senior administration officials.
- For the Administration to go forward with “nuclear energy beyond 2010” the lead lab site at Idaho requires an immediate and significant increase in funding to, e.g., clear up maintenance backlog and make key facilities mission ready.
- University participation (faculty and students) should be a basic element of “nuclear energy beyond 2010” R&D.
- Some facilities should be shut down or not considered for further development. This includes the uncompleted Fuel Processing Facility. There may be others such as the Fluorine Dissolution Process Cell (FDP).
- New facilities will probably be needed for the purposes of “nuclear energy beyond 2010”. This may include a source of fast neutrons, among others. It is recommended that a specific study be conducted to determine the need for steady and transient fast neutron facilities in the U.S. This study should consider accessibility of existing support facilities.
- To optimize the use of facilities and staff resources, facilities beyond the Idaho site, but in the U.S. (e.g., ANL-E, Oak Ridge, and Savannah River), and international sites in the Gen IV partner countries should be integrated into nuclear energy R&D plans.
- Given the designation of INL as the lead nuclear energy R&D laboratory, an external review process for laboratory activities should be established. There should be broad representation of stakeholders from universities, other laboratories, international partners, and others.

The Energy Subcommittee asked that the following questions be addressed:

1. What role do you recommend that Argonne National Laboratory and other national laboratories with nuclear expertise play in nuclear energy R&D after the Idaho National Laboratory (INL) is established?

The DOE Office of Nuclear Energy has aggressively expanded its research and development missions to encompass a wide range of topics, such as:

- Advanced Fuel Cycle Initiative (Series 1 and Series 2),
- Generation IV Roadmap and associated Advanced Reactor Design,
- Nuclear Energy Research Initiative (NERI and INERI) for basic studies,

These initiatives along with service to NASA and the Navy in nuclear energy activities encompass what might be called “Nuclear Energy Beyond 2010”.

Such a wide range of endeavors requires active and careful coordination with other DOE laboratories and universities that are providing leadership as well as crucial research support. It is essential that DOE and the new INL contractor effectively integrate into the NE R&D mission the facilities and staff of universities, international partners, and other national laboratories, e.g., ORNL, ANL-East, Savannah River, and Hanford. It is clear that DOE Office of Science and NNSA funded laboratories are engaged in significant nuclear energy R&D activities. Strong direction from the Secretary of Energy will be needed to ensure appropriate allocation of resources across this wide spectrum of nuclear energy R&D activities.

Given the assignment of INL as the lead nuclear energy R&D laboratory the DOE should move quickly to establish an external review process for laboratory activities to assist in strategic planning and missions coordination.

2. The Department has indicated that INL will be a multi-purpose laboratory, but the current strategic plan for the Idaho National Engineering and Environmental Laboratory emphasizes the laboratory's transition to a focus on nuclear related research. What specific programs should the Department support at INL beyond nuclear and environmental management related research?

NERAC has another subcommittee, of which I am a member, that is looking at characteristics of world class laboratories and what will be needed to have INL reach world class level over the next ten years. One issue is whether INL should be a multi-purpose laboratory or be singly focused on nuclear energy R&D. For example, we have asked whether the Homeland Security mission will detract from the ability to become world class in nuclear energy R&D. The Subcommittee has raised an important question. I will need further discussions with my NERAC colleagues before I will feel competent to identify specific programs that should be supported beyond nuclear and environmental management related research.

3. The Next Generation Nuclear Plant (NGNP) has been described both as a demonstration of commercial viability and as a research test bed. What is your view of the purpose of the NGNP? To what extent is the design of the NGNP being influenced by the requirements imposed by hydrogen production? To what extent will INL be capable of world leadership in nuclear energy R&D if the Next Generation Nuclear Plant (NGNP) does not go forward?

I believe that the NGNP is a needed step in demonstrating the capability to economically produce hydrogen as an alternative to the burning of fossil fuels. The design of the NGNP is driven by the requirements imposed by hydrogen production, that is, the need for substantially higher temperatures than those available from the current generation of light water reactors. The higher temperatures will also increase the efficiency of electrical generation. The R&D needed to bring the NGNP to fruition will be demanding and should attract world class staff to be involved in the project.

One of the characteristics common to many, but not all, of the world class laboratories that our NERAC subcommittee members have visited is the presence on site of a user facility. Once up and operating the NGNP would not be seen as a user facility. There are other research facilities that could be pursued in the event the NGNP does not go forward, e.g., sources of steady state and transient fast spectrum neutrons. Another might be becoming the center of excellence for the facilities needed to lead the Advanced Fuel Cycle Initiative.

Thus, I believe that INL will be capable of world leadership in nuclear energy R&D whether or not the NGNP goes forward.

A commitment to substantial long term funding. In every discussion and every reference reviewed by the current subcommittee, the key to becoming a world class laboratory is the presence of an underlying long term commitment to excellence and assured funding of both facility and human resources. DOE has taken a step in that direction by specifying that the new contactor for INL will have a ten-year contract term, conditioned on satisfactory performance. At a time when our national resources are severely challenged, I believe that DOE and OMB will need to make major changes in the allocation of DOE resources to fund the development of a world class nuclear energy R&D laboratory at INL.